Sustainable Historic Environments hoListic reconstruction through Technological Enhancement & community-based Resilience

D. 6.2 ICT- Community Interaction Rulebook

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Glossary

Acronym	Full name
CBA	Community-Based Approaches
CCA	Climate Change Adaptation
CIR	Community Interaction Rulebook
DDA	Data-Driven Approaches
DRM	Disaster Risk Management
ICT	Information Communication Technology
IPCC	International Panel on Climate Change
GLOCAL	Global and Local
OL	Open Lab
WP	Work Package

1 Executive summary

The following report outlines the development of a community interaction rulebook (CIR). This rulebook aims to explore the role of information communication technology (ICT) in adaptive governance and identifies some critical conceptual and operational 'rules' to guide the development of the Open Labs (OL) in WP7 within the SHELTER Project, as well as the development of adaptive governance schemes in T6.3. Furthermore, the elements of the CIR will help to shape the broader outcomes of the SHELTER Project. The SHELTER project aims to link the scientific community, the conservators & heritage managers, the international community, and citizens under the overall aim of managing cultural heritage within the community- and knowledge-based criteria.

Three separate literature reviews drew out the critical aspects of academic literature. The first literature review explored and briefly outlined the key elements of the significant concepts, considered essential to reinforce the CIR. Such as; disaster risk management (DRM), data-driven approaches (DDA), climate change adaptation (CCA), cultural heritage, and finally, adaptive governance. Providing explicit definitions of these concepts allows individuals to use the CIR to develop approaches that are consistent with the broader academic work — allowing for fundamental connectivity across different methods and applications regardless of the bespoke variables within a cultural heritage site. This literature review also consolidates the major research trends developing across academic literature, including the role of sentience and artificial intelligence within ICT and the importance of ICT in allowing experts to embrace the inherent complexity typically associated with social sciences. Outlying the major research trends within the scope of the CIR was consider essential to make sure that any outcomes of the SHELTER project, utilizes cutting edge research.

The second literature review explores the current role of ICT within community-based approaches (CBA) to identify the consistent operational aspects and guidance that are important for good CBA to work. The operational guidance is followed by the final literature review, which explores the different elements surrounding accessibility and inclusion by analyzing how CBA can reach as many members of the community as possible across different demographics.

The outcomes of the three-literature reviews form the basis of the CIR, which starts on page 37. Similarly, the CIR consists of three distinct parts that reflected the contents of the different literature reviews. Part 1 of the CIR provides a brief explanation of the conceptual framework in the shape of a figure, which brings together the five key concepts (DDA, DRM, CCA, cultural heritage, and adaptive governance) by providing accessible definitions and characterizing their core aspects. The definitions are provided in conjunction with contemporary research trends that are perceived to influence the outcomes of WP6 and the Open Labs (OL). This section draws on aspects such as the growing need for practitioners to acknowledge and embrace the complexity of climate change and its effect on important cultural heritage sites rather than be overwhelmed

by it. Furthermore, the section draws upon the increasing role of sentience and artificial intelligence in decision-making processes and how experts should also embrace it.

After the outline of the conceptual framework, the CIR uses the literature explored in the previous chapters to define nine explicit rules which aim to establish some of the critical operational guidance when developing CBA that utilize ICT. These rules cover a wide variety of factors, which include the different types of communities and how to develop CBA, which; maintain the legacy, identify and allocate appropriate funding, utilize the pre-existing sense of 'community,' as well as guidance for selecting or assisting effective facilitation.

Finally, the CIR concludes with four rules explicitly focused on accessibility and inclusion of isolated communities and demographics. These four rules highlight topics such as socioeconomics, which, according to academic literature, have a profound effect on the take-up and usages of ICT. As well as, how to reach isolated rural communities and the contemporary trend of rapid urbanization and the challenges urban environments bring on developing strong community bonds.

Together, the rules provided in part 2 and part 3 help guide the development of CBA, which aims to protect cultural heritage and as a result, are supported by prompts and guidance to help any experts to use them within their approach. The rules within the CIR are in no particular order of importance. They shouldn't be rigidly followed, but instead used to help stimulate thought and further development within the specific context and variables unique to each cultural heritage site (and OL).

Throughout the development of the CIR, there were some key findings and conclusions which were particularly important to explore in greater detail. The first of which is the importance of creating CBA, which puts people at the core of the approach, considering them not only as individuals who engage with tangible and intangible aspects of cultural heritage. But, fundamental actors at all stages of the DRM cycle in the valuation, evaluation, and protection of these sites as long as they have accessible platforms to engage with broader decision making. As well as trusted well-equipped facilitators to help lead, organize, and mobilize them. Furthermore, by ensuring that CBA approaches are designed with people at their core, they are community-led, community-owned, and community-driven, which are all key aspects that are fundamental to the long-term reliability and resilience of effective CBA. That can not only operate independently of the changing pollical landscape and bureaucracy but are designed according to the unique context, subjective variables, and available resource of place and under the ownership of those local communities.

It also became apparent that it is essential to ensure CBA establishes solutions proactively before a disaster occurs, reducing the response time often seen in the recovery phase of the DRM cycle and increasing the ability of different stakeholders to mobilize. Secondly, the report emphasizes the importance of 'facilitators' within CBA. Facilitators can either be individuals or organizations which provide an essential bridge between the strategic DRM plans and effective local scale delivery. The role of facilitators is critical in the organization and mobilization of local community groups. However, the

report highlights the tremendous amount of responsibility this role entails, as well as the vast array of qualities this role requires.

The report also highlights some exciting avenues of further research with implications beyond the scope of the SHELTER project. For example, it is clear that the term 'community' while widely used in research, policy, and practice alike lacks a universally accepted explicit definition and, as a result, is open to interpretation. Within this space, the different terminologies used to define different types of communities, such as 'groups,' 'communities of practice,' 'networks' etc. can become blurred. The report builds on a small amount of existing research that argues that different types of communities have distinctly different characteristics that could separate them into distinct typologies. These typologies may help experts to broadly identify what kinds of communities exist within any given situation and then select tools and methodologies with the highest capacity to engage with them and draw from local knowledge sources. Identifying the need for contemporary research to explore the distinctions between these community groups allowing for the identification of different types of communities and design approaches within DRM, which have the highest capacity for successful engagement. An issue widely cited amongst large scale policy development.

Furthermore, the report highlights a critical 'weak point' regarding the paradigm shift into the reliance ICT in all aspects of contemporary governance, policy development, and practical delivery. While the value that ICT provides experts is undeniable, these tools are only as useful as the infrastructure in place to make them accessible. The CIR highlights the vulnerability of the systems, especially at times of disaster, calling for the improved maintenance and vulnerability assessments of the infrastructure. Also, how historically, these systems have failed to reach the isolated rural communities and may not be fully accessible by different population demographics as a result of a multitude of reasons such as; socioeconomics, gender, and age.

Finally, while the report focuses on the development and exploration of existing knowledge to create the different aspects of the CIR, the operational guidance and 'rules' essential to inform the development of DRM strategies and CCA within the OL is found from page 37 onwards. The CIR has identified a total of thirteen broadly defined 'rules' designed in a way to help stimulate and promote in-depth thought and discussions about developing DRM strategies and CCA tools. It is important to note at this early stage that these rules are provided in no specific order of importance.

2 Introduction

The following report outlines the development of a CIR submitted as part of the more extensive ongoing work within the SHELTER project. Specifically, the CIR is subtask 6.2 and was developed as part of WP6 lead by the University of Liege (ULIEGE). WP6 aimed to create innovative and collaborative tools to support CBA for resilience enhancement in important cultural heritage sites within the OL across WP7. To achieve this, the following report examines the different aspects of the CIR, including; its specific aims, objectives, the exploration of relevant academic literature, and finally outlines thirteen broadly defined 'rules' to help guide experts charged with the development of CBA for resilience enhancement.

2.1 Aims & objectives

2.1.1 Aim

The report aims to explore the role of ICT in adaptive governance to develop a CIR to help guide the development of CBA to DRM for cultural heritage within the SHELTER Project.

2.1.2 Objectives

1) *Explore* the conceptual underpinnings of the key concepts relevant to the development of a CIR within the context of the SHELTER project.

2) *Encapsulate* the critical aspects of the overarching concepts, which are essential to the development of valid and reliable CBA, attempting to enhance the resilience of cultural heritage sites.

3) *Investigate* the role of ICT based tools in the operationalization of CBA attempting to enhance the resilience of cultural heritage sites

4) *Identify* and draw from the aspects of 'best practice' and the critical 'lessons learned' from them.

5) Establish measures to ensure equal access to ICT across all scales of the population with specific reference to equal representation.

6) Consolidate the outcomes of the above objectives into a CIR to help guide the outcomes of the SHELTER Project.

2.2 Relations to other aspects of the SHELTER project

The CIR forms part of the WP6, which aims to develop innovative, collaborative tools to support CBA for resilience enhancement in heritage adaptation. As a result, elements of the CIR interact directly with other aspects of the WP, including; the GLOCAL strategy proposed in T6.1 and the adaptive governance mapping schemes in T6.3. The reason for this is because the development of a practically useful and conceptually sound CIR requires an exploration of broader academic literature and an understanding of global and local knowledge bases.

Furthermore, the CIR will inform the ongoing work within WP5. WP5 aims to define and develop a data-driven platform aiming to provide accessible data and services to all methodologies and solutions implemented throughout the SHELTER Project. The rules within the CIR will help to shape the data-driven platform into a practically useful outcome, which is consistent with the broader conceptual framework and operational guidance that ensure usable CBA.

Finally, the CIR will be directly used to shape the outcome of the five OL in Santa Croce in Ravenna, Seferihisar, Dordrecht, Baixa Limia-Serra Do Xurés Natural Park in Galicia and finally Sava River Basin as part of WP7. For more information regarding the specific timelines and use of the CIR, see the 'Open Lab management plan (D9.2)'. The CIR will be given to each of the case study coordinators to help provide simple conceptual grounding and broad operational guidance on how to effectively engage with local community groups and develop CBA to DRM.

2.3 Report structure

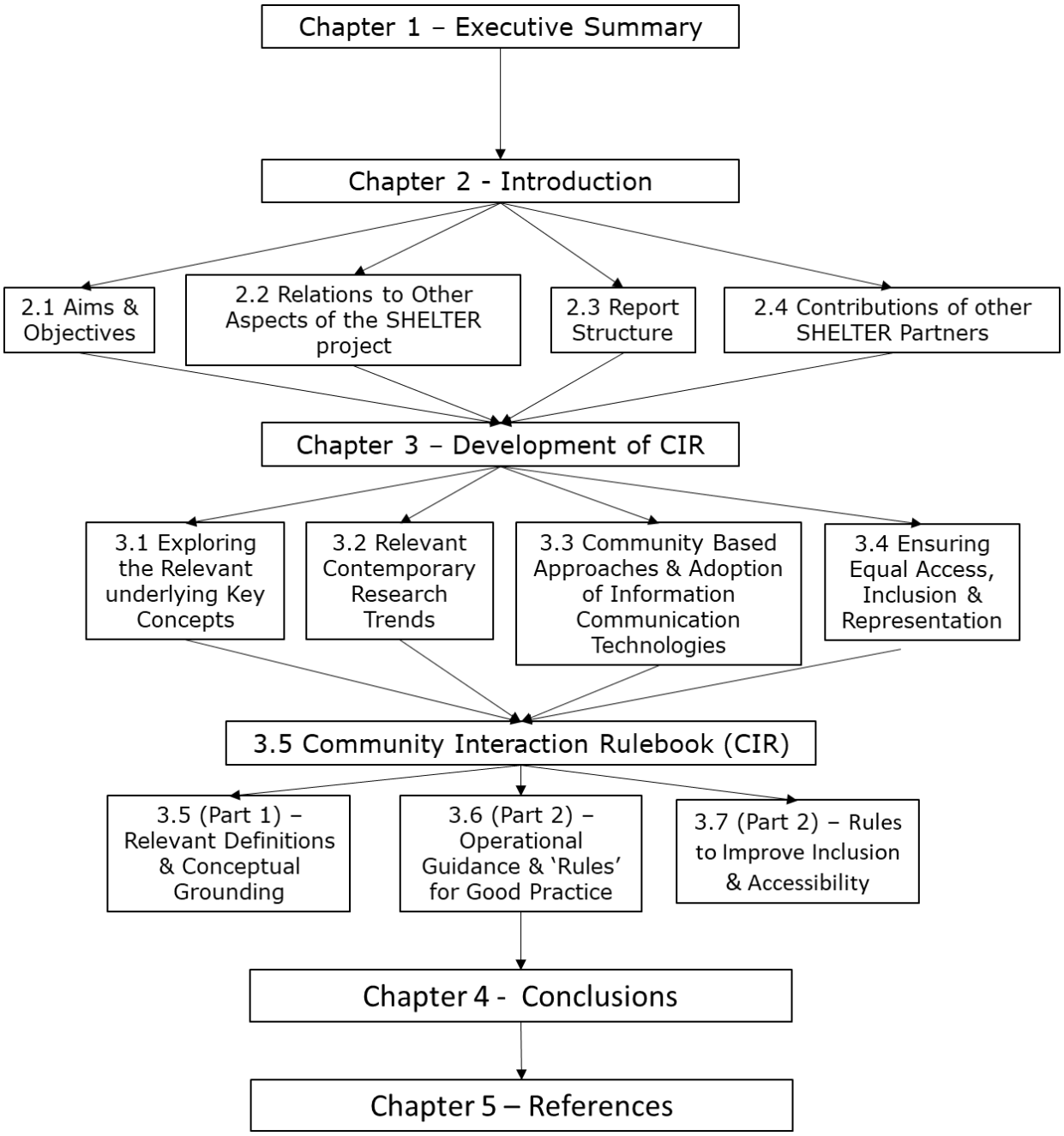

Figure 2. Breakdown of the report into its different sections and how that relates to the development of the CIR.

The following report has separated into three chapters. Chapter 3.1 attempts to explore the epistemological roots and fundamental conceptual framework that reinforce the development of the CIR; these include DDA, DRM, CCA, cultural heritage, and adaptive governance. For each concept, a brief literature review helps to draw out the principal elements and characterize them for CIR. These definitions form the first part of the CIR and provided necessary foundations to ensure that any outcomes developed as a result of the guidance within the CIR remain consistent with the broader academic literature and up to date research work. Secondly, stimulated by these literature reviews, the authors consolidate the most influential contemporary research trends from across DRM, DDA & CCA within chapter 3.2. In chapter 3.2, the authors draw on cutting edge aspects such as sentience and artificial intelligence in an attempt to facilitator the OL co-ordinators and the local level stakeholders to consider the most up to date technological advancement in the development of their CBA.

Following this, chapter 3.2 of the report explores the literature surrounding the role of ICT in CBA with a specific emphasis on DRM & CCA. Notably, the particular operational aspects that are important in the delivery of CBA which utilize ICT. Section 3.2 explores the definitions, purpose, and role of 'community' in the development of CBA and the potential of ICT to not only provide a platform for the development of these communities but enhance, mobilize and engage with them. Furthermore, the section looks at how ICT has the potential to bridge the gap between the slow rate of data transfer and alleviate some of the disparity between stakeholder groups. After this, chapters 3.3 & 3.4 investigate the role of networking, mainly social media within the context of cultural heritage and the likely barriers and the issues that can be drawn from available literature regarding the active inclusion of all relevant stakeholders within CBA and how to enhance access to the material.

For ease of reading and access, the CIR is separated into three 'parts' designed to reflect the three different explorations of literature as outlined above. Part 1 of the CIR outlines the relevant definitions and essential conceptual framework. Part 2 of the CIR provides nine rules which are intended to provide operational guidance for those attempting to develop long-lasting and effective CBA to protect cultural heritage sites. Finally, Part 3 of the CIR outlines four rules and signposts readers to potential tools, which will assist in ensuring that CBA that are developed are inclusive, accessible, and involve all relevant stakeholders.

Structuring the report in this way allows the OL co-ordinators and other practitioners to proceed directly to page 37, where the operational rules and guidelines within the CIR is found.

2.4 Contribution of partners

Partner	Contribution
ULIEGE	Development of the Report
UNIBO	Review the Whole Document
POLITO	Review the Whole Document
TECNALIA	Review the Whole Document
IHED	Review of Initial Drafts
ISMB	Review of Initial Drafts
SIST	Review of Initial Drafts
EKO	Review of Initial Drafts
NBK	Review of Initial Drafts
EGIS	Review of Initial Drafts
UPV/EHU	Review of Initial Drafts
LINKS	Review of Initial Drafts
CRCM	Review of Initial Drafts

Table 3. Contributions of the SHELTER Partners

3 Development of the CIR

The following chapter explores five key concepts that underpin the development of the CIR. These are as follows; DDA, DRM, CCA, cultural heritage, and finally, adaptive governance. A clear understanding of the critical underlying concepts and their relation to the development of a CIR within the context of the SHELTER Project was essential. For each concept, a simple thematic analysis highlighted the common themes. An explicit but straightforward characterization of each concept would help to ensure that any outcomes of the CIR remained consistent with the broader academic literature and fundamental underlying concepts.

3.1 Exploring the relevant underlying key concepts

3.1.1 Data-driven approaches within community-based approaches

Within the last decade's advancements in modern technology have made the collection, analysis, and dissemination of large quantities of data cheaper and more efficient (Lee, 2002). The reduction in cost is particularly true with regards to data collection on the topics related to earth system science. A research trend that has been stimulated by the growing importance of climate change (Auffhamer *et al*., 2013) hundreds of terabytes of data are collected about our climate and transmitted daily (Agapiou, 2017).

As a result, this has created a wealth of freely accessible and continually updated metadata sources that attempt to help experts to make more informed decisions and strategies (Auffhamer *et al*., 2013). Many individuals have taken advantage of this available data leading to a profound uptake of DDA across different disciplinary lenses with subtly different iterations depending on the application. These include but are not limited to; data-driven approaches, machine learning approaches (Rechstein *et al*., 2019; Rahmati *et al*., 2020) and statistical modeling. However, despite the vast array of iterations and apparent uptake, it is challenging to find academically sound sources that clearly and explicitly outline the aspects of 'good practice' when delivering DDA, which are essential in the development of the CIR. According to Ginzarly *et al*. (2019), one reason for this is because of the apparent disparity between local communities and experts in how they value and manage cultural heritage. Still, it can also be linked to a fundamental reason for digitization. So, despite the considerable amount of data being made available by advancements in ICT, it isn't exploited for lack of transversal data management. Within the context of the project, a simple set of characterizing factors of DDA has been encapsulated below (see figure 2).

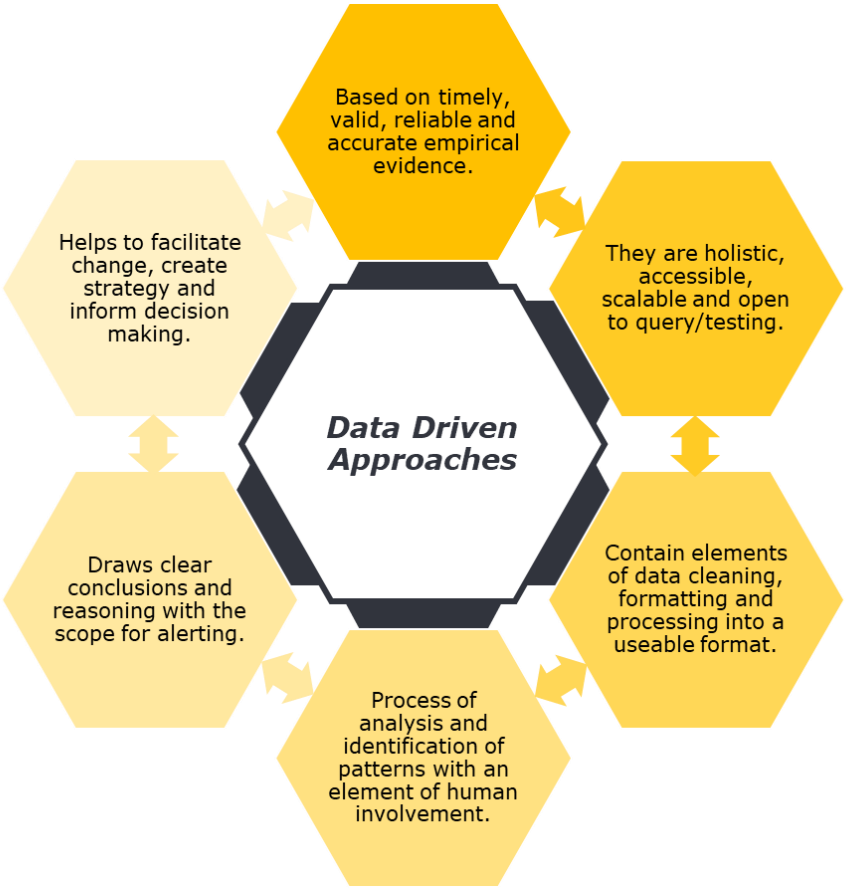

Figure 2. Characterization of critical aspects of DDA developed using a simple thematic analysis drawing out elements across academic literature.

It is essential to consider DDA implementation within CBA. While many individuals praise the power of DDA for allowing the development of more informed research and decision making (Ford *et al*. 2016), some authors have lamented at the slow transition of capable software into practice and the apparent delay of information exchanges between different scientific disciplines (Moss *et al*., 2010). Pointing out an issue that the availability of data may not be the problem, but the role of humans as mediators of DDA creating a bottleneck in the practical usage and application of DDA with practical applications.

Furthermore, one potential issue with regards to SHELTER is the consideration that individual personal perception is one of the most dominant drivers behind the decision-making processes, especially at the local level (Lerner & Keltner, 2000; Lerner *et al*., 2014). However, historically this critical dimension is rarely included in the broader DDA, which are typically derived by top-down systems. As a result, the CIR needs to appreciate that individuals at the local level make decisions using perceptions and emotions, which are more difficult to quantify, and the application of DDA at the community level must take this into account. It is in this space in which ICT, such as social media, can bridge the lack of information/data sources/systems by providing an accessible mechanism for

capturing these perceptions in real-time. Still, the trade-off is that humans become a much higher component in the data collection and development process.

As a result, it is essential to the SHELTER Project that the CIR emphasizes the importance of individuals at the local level and brings their perceptions into the decision-making process. But they are using ICT to speed up the interdisciplinary knowledge exchanges and also to incorporate local people's perceptions and emotion towards cultural heritage in an attempt to overcome the adverse effects of including humans in DDA.

Aspects important for the CIR

1) **There are consistent elements for any DDA, which are essential to consider when attempting to develop CBA utilizing ICT and have been outlined in Figure 2.**
2) **ICT provides an opportunity to speed up knowledge exchanges between disciplines and across different stakeholders, which can overcome some of the limitations typical in CBA.**
3) **When attempting to develop CBA, which utilizes large data sets, it is essential to compare and supplement them with local knowledge, perceptions, and experiences which may differ.**
4) **The role of humans in the analysis and transition of Data into practical approaches may provide a bottleneck at the local level.**

3.1.2 Disaster risk management

The roots of the modern interpretations of DRM can be traced to the 1990s in which an '*International Decade for Natural Disaster Reduction*' was declared by the United Nations general assembly. This declaration, in turn, led to the development of the '*Yokohama strategy*' (see. UNDRR, 1994). The Yokohama strategy stressed increased accountability for countries to protect its people from increase disaster risk exacerbated by climate change. It also emphasized the need for a global paradigm shift in the way countries respond to disasters. Calling for a transition from reactive strategies to more prevention-based policy (Sperling & Szekely, 2005). This paradigm shift was stimulated by the growing realization that natural disasters were no longer treated as one-off events but regular risks to society (Yodmani, 2001). Despite this, however, the paradigm shift didn't seem to produce a consequential effect and/or translate into practice. As there is a profound dis-alignment of the theoretical notion with practices and policies. The effectiveness of the definition doesn't align with a unified re-thinking risk management and reduction, that needs to be implemented. This is why there is a call for research into developing this theoretical-practical divide (such as the SHELTER Project). The international panel on climate change (IPCC, 2012) defines DRM as;

> '*…Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction, and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of*

increasing human security, well-being, quality of life, resilience, and sustainable development.' (IPCC, 2012 p.5)

This definition provides a detailed explanation of what effective DRM entails and provides a valuable reference point to ensure that when CBA are developed using the CIR, the outcome remains consistent with the broader DRM literature. An exploration of DRM literature helps to develop a more detailed picture of the concept and the key aspects which can be used to categorize the concept with them for use in the CIR. For example, noteworthy guidebooks and tools to help with the development of effective DRM strategies include; '*Disaster Risk Management Systems Analysis: A Guidebook*' Baas *et al*., (2008). For ease of access, a thematic analysis of a variety of definitions and applications of DRM was conducted. The following figure has been developed, which distills these critical characteristics of DRM within the context of the CIR for the use with the OL (see figure 3).

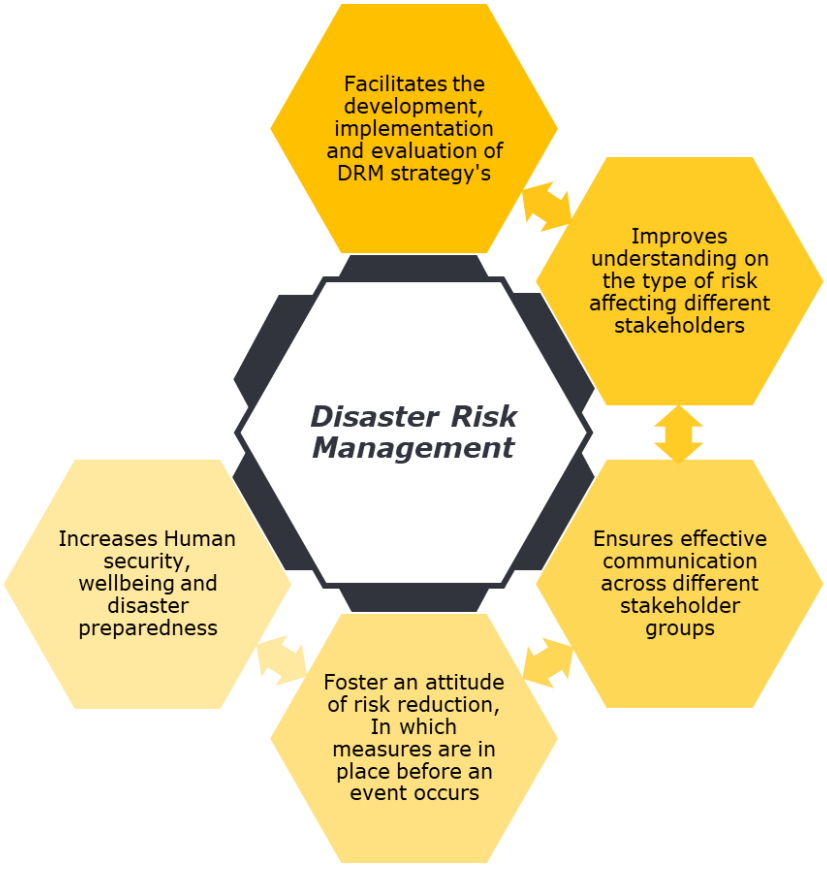

Figure 3. Characterization of the critical aspects of DRM developed using a simple thematic analysis of definitions and different applications.

With a specific reference to the SHELTER project, to develop genuinely holistic solutions to DRM that will reduce the vulnerability and increase the resilience of cultural heritage sites, researchers call for a more transdisciplinary research agenda (Bladassarre *et al*., 2014; Culwick & Patel, 2016). In which, experts, policymakers, and local communities

collaborate across disciplinary boundaries and at different spatial scales to fully appreciate the interconnected nature of the risks (Bladassarre *et al*., 2014). This will allow for the development of coherent multi-pronged strategies across academia, policy, and practice (USAID, 2011), which can be considered more significant than the sum of its parts. As a result, it is essential to appreciate that CBA will form only one part of a much more comprehensive DRM strategy. Therefore, it must be developed in collaboration with other stakeholders and potentially other communities. Such as those defined within the scope of the SHELTER Project, including the development of bottom-up and top down user requirements through the GLOCAL strategy utilized and outlined in T6.1 as well as the applications and testing within the Open labs in WP7.

Aspects important for the CIR

1) **CBA form part of the broader transdisciplinary approach to DRM and, therefore, should be developed considering the more extensive ongoing work at different scales and different disciplinary lenses, not in isolation. Integrating them into the landscape scale approaches across spatial and temporal scales.**
2) **There are crucial characteristics that can help to ensure that any CBA are consistent with overarching DRM Strategies, which can be seen above in Figure 3.**

3.1.3 Climate change adaptation & local communities

Experts mostly agree with a high degree of certainty that human activity is having a direct effect on climate change (IPCC, 2014). In recent decades we have seen an increase in both the frequency and severity of climate-related disasters (Thomas & Lopez, 2015; IPCC, 2018). As a result, an adaptation approach and coherent measures to mitigate against the damage to the economy, society and the environment of these events has become increasingly prevalent across academia, policy and practice (Lim *et al*., 2004; Esnor & Berger, 2009; Eriksen *et al*., 2015). In concepts such as CCA & DRM, which conceptually share many similarities (Mercer, 2010). Climate change adaptation is defined as;

> '*adjustment's made to practices, processes, and structures in order to consider the changing climate conditions*' (McCarty *et al*., 2001).

Contemporary research trends have indicated a shift in practices in which a focus is on CBA to CCA because of a failure of large governing bodies. According to Shaw (2012), before the formation of large governing bodies such as states, climate management, and adaptation was dealt with collectively but not referred to as 'community-based.' Therefore, the concept of CBA to CCA is not a novel one, and this can be classed as a resurgence in research into community-led CCA (Ayers & Forsyth, 2010; McNamara & Buggy, 2016).

The concept of CCA can be found across a wide variety of disciplines including but not limited to; food security (Lobell *et al*., 2008), Infrastructure (Hallegatte, 2009), Tourism (Scott & McBoyle, 2006), biodiversity & conservation (Mawdsley *et al*., 2009), etc. Indicating that the concept is well embedded across academic literature and policy. As a result, there is a considerable amount of conceptually rich material and valuable pragmatic examples to draw from to support the development of the CIR. These provide essential resources to draw helpful conclusions to incorporate the critical conceptual aspects of CCA into the CIR. The following figure was developed by thematic analysis to identify the common characteristics of CCA from across academic literature in figure 4.

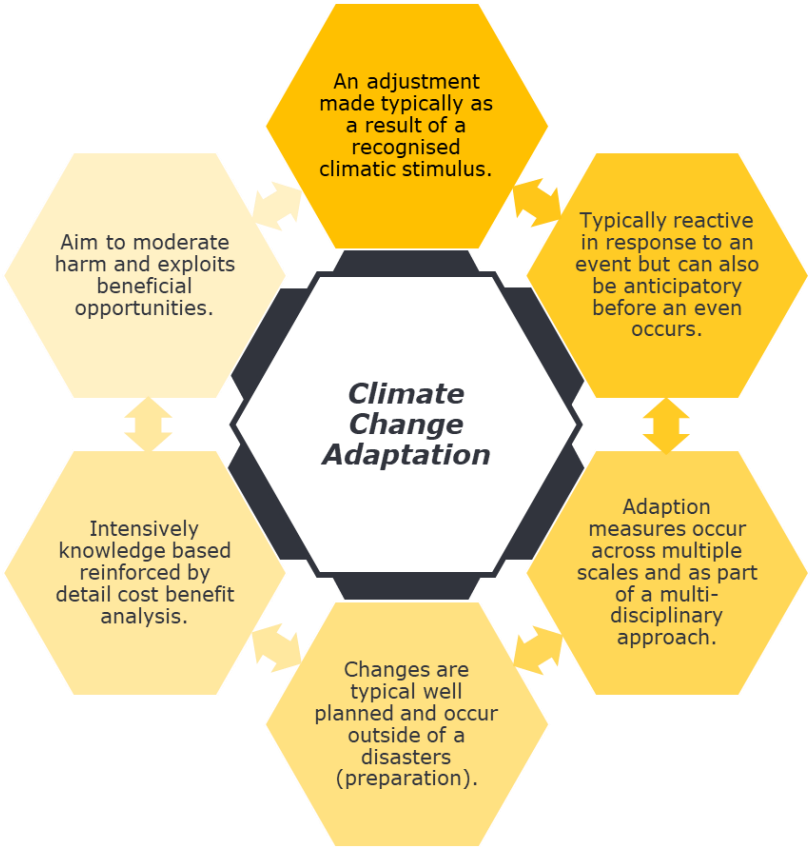

Figure 4. Characterization of the critical aspects of CCA as a result of a simple thematic analysis consistent across academic literature and considers their transition into CBA.

However, initially, the momentum across research and policy advancements struggled to filter down into practical solutions on the ground (Ayers & Forsyth, 2010) despite the increasing emphasis on the importance of communities in CCA strategies. There isn't a precise mechanism taking the extensive data and making it practically useful to local communities.

Several barriers have been identified across the literature to explain this lack in transition. While the explicit characterization of these barriers is under debate (Eisenack, 2014) as it varies greatly depending on context and situation. Biesbroek *et al*. (2013) identified seven barriers hindering the implementation of climate change adaptation; 1) Conflicting timescales. 2) Substantive, strategic, and institutional uncertainty. 3) Institutional crowdedness and institutional void. 4) Institutional fragmentation. 5) Lack of awareness and communication. 6) Motives and willingness to act by local people because they will not prepare for a disaster in which they have not experienced first-hand. 7) lack of resources. There is evidence from other academic sources to support the fact that within CBA, especially local actors are reluctant to adapt to events and/or disasters they have not directly experienced (Amundsen *et al*., 2010). Therefore, the conclusion can be made that CCA remains reactive because local communities will only adapt to events that have already happened.

Aspects important for the CIR

1) **Impact based scientific inputs to CCA strategies are insufficient at producing useful CBA, and a more proactive approach is needed to ensure that measures are in place before a disaster.**
2) **Greater emphasis needs to be placed on a reliable and accurate mechanism to help this data be in a useful format to be implemented by CBA.**
3) **CBA to CCA requires a bottom-up approach in which the local community co-produce the solutions through participatory processes, which considers a unique local context.**

3.1.4 Contextualizing cultural heritage within the scope of the SHELTER project

The concept of cultural heritage is described as a 'multifaceted,' 'broad,' and 'nebulous' covering a wide variety of aspects (Szmelter, 2013). While any number of sources would provide a valid and applicable definition to be used in the report the one by Kersel & Luke (2015) has been selected because of its simplicity, that is outlined below;

> '*…something that someone or a collective considers to be worthy of being valued, preserved, cataloged, exhibited, restored, admired*.' (Kersel & Luke, 2015).

The concept of cultural heritage covers a wide variety of factors, both tangible such as; paintings, monuments, buildings, and artifacts, as well as intangible aspects such as; oral traditions, arts, and rituals (UNESCO, 2017). Since the turn of the millennium, there has been increased recognition of the importance of cultural heritage sites and the risk they face from climate change (Sabbioni *et al*., 2010; Reeder-Myers, 2015). The increasing importance is mirrored in the growing research interest around the protection of valuable and threatened sites (Fatorić & Seekamp, 2017). A brief review

of the contemporary literature on cultural heritage can help to elicit some essential characteristics which have been categorized in the figure below. (see figure 5)

Figure 5. Characterizes the critical aspects of cultural heritage, developing using simple thematic analysis from some of the literature.

First of all, much of the research into cultural heritage in association with climate change appears to have been focused on prediction and modeling. To inform CCA strategies by providing evidence on how cultural heritage is likely to be affected (Brimblecombe *et al*., 2011). The work has a definitive conclusion that the combination of climate change factors is going to have a dramatic impact on cultural heritage, particularly within less economically developed countries. Secondly, in complement to the growing research around modeling, increasing research emphasis has been placed on attempting to assign specific economic 'values' on the essential cultural elements. One most notable is the work by Navrud *et al*., (2002) provides a much more economic perspective on cultural heritage by comparing crucial cultural heritage items to environmental goods. In that, they are classed as 'public goods. By this, they argue that cultural goods can be assigned and valued and, therefore, be integrated consistently into economic decision making (Navrud *et al*., 2002).

Aspects important for the CIR

1) **Cultural heritage is a difficult concept to define as it is valued differently depending on the disciplinary lens and the stakeholders. There is a widely untapped local knowledge resource to be exploited, which can help to make more informed decisions and better manage cultural heritage sites that people value.**
2) **However, a great deal of research work has been conducted, producing valuable tools and resources to aid decision-makers.**
3) **There is a disparity between how stakeholders value cultural heritage, which may be limiting the effectiveness of approaches.**
4) **The involvement of local communities in the identification and characterization of cultural heritage is key to shifting to an accurate and representative value-based approach.**
5) **The context of cultural heritage needs to be updated and contextualized. Bringing together different sources of knowledge to make better-informed decisions on individuals at the local level's cultural values.**

3.1.5 Adaptive governance & community-based approaches

The concept of adaptive governance has been widely researched within the last few decades (Dietz *et al*., 2003; Folke *et al*., 2005). It is believed to have developed as a result of the belief that traditional top-down governance mechanisms do not adequately deliver solutions at relevant scales. Adaptive governance does not originate from a specific disciplinary lens, but a variety (Dajalante *et al*., 2011) and therefore produces multiple objectives to which the governance addresses. Also, they could not adapt to the increasing uncertainties around the rapidly changing climate. In short, a response to the apparent shortfalls in historic governance mechanism to coordinate resource management in increasingly complex systems (Chaffin *et al*., 2014). Adaptive governance, therefore, provides an alternative framework to deal with more complex social-ecological systems allowing for the incorporation of concepts such as flexibility and resilience into the planning and implementation process within urban environments (Sharma-Wallace, 2018).

There are many definitions of adaptive governance, and a literature review highlights several, which are cited, including but not limited to (Hatfield-Dodds *et al*., 2007; Chaffin *et al*., 2014). For example, Lemos & Agrawal (2006) define adaptive governance as a set of '*regulatory processes, mechanisms, and organizations*.'. Similarly, Sharman-Wallace (2018) highlights the role of adaptive governance as a '*form of holistic management*' between stakeholders. However, Kay *et al*. (2001) highlight how adaptive governance can facilitate trade-offs between different stakeholder opinions. Below is a figure that characterizes the critical aspects of adaptive governance (see figure 6).

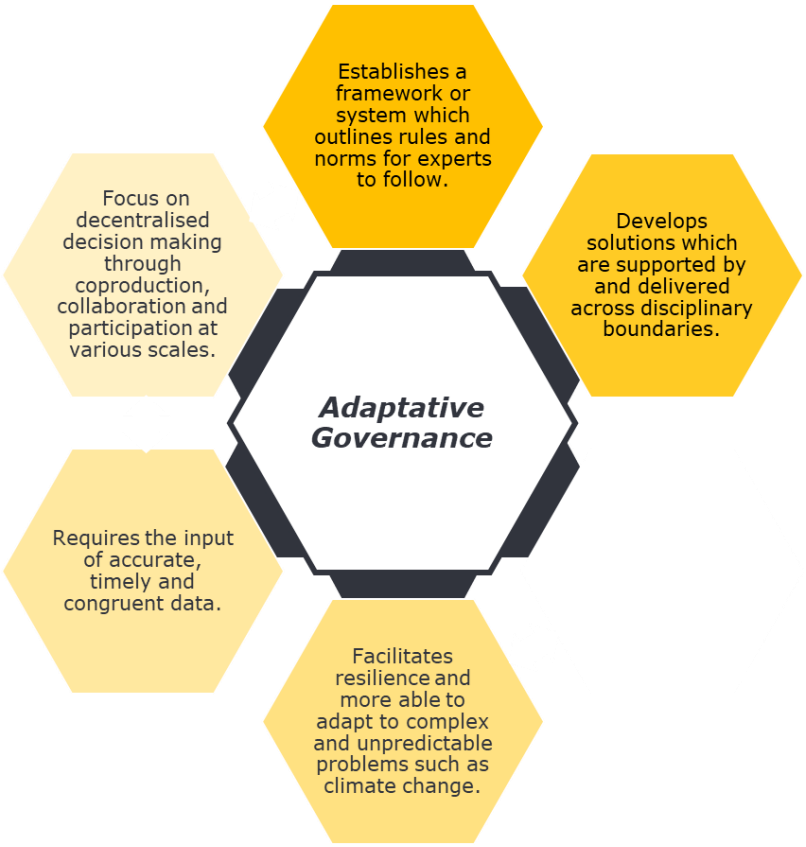

Figure 6. Characterizes the critical aspects of adaptive governance consistent across academic literature developed using a simple thematic analysis

During periods of crisis, the more adaptive forms of governance provide a significant number of advantages over other more fixed governance mechanisms (Folke *et al*., 2005). First of all, adaptive governance allows for more rapid and effective connections with stakeholders across different scales, tapping into local knowledge and resources in which key persons provide leadership, trust, vision, and meaning (Folke *et al*., 2005).

Interestingly, Brunner *et al*. (2005) draws a direct link between the increasing rise of CBA and the emergence of adaptive governance across academic literature. Growth of community-based initiatives marks the appearance of adaptive governance from the remnants of scientific management in certain places, highlighting the inherent link between adaptive governance and the empowerment of local community development initiatives. Drawing from the conceptual literature around adaptive governance, some essential elements can be drawn out and applied to the CIR. The first is the importance of adaptive governance in facilitating CBA.

Aspects important for the CIR

1. **According to literature, it appears as though the concept of adaptive governance and CBA are inherently linked to one another. Therefore, a CBA must be consistent with the principles of adaptive management.**

3.1.6 Summary of key concepts & discussion

The short literature reviews above characterize the critical ingredients of the core conceptual framework that are considered to have a direct influence on the development of the CIR. An understanding and appreciation of the broader conceptual framework that underpins the development of CBA and ensures that any outcomes remain to consist of the broader academic literature. The following section continues to explore the relevant contemporary academic writing but rather than consolidate the critical thesis and characterize the conceptual framework for the CIR. The section attempts to highlight the modern research trends visible across related disciplines.

3.2 Relevant contemporary research trends

The following section of the report briefly highlights the contemporary research trends across academic literature identified during the exploration of the critical concepts above. Specific focus has been given to DDA, CCA, DRM, and adaptive governance within the context of cultural heritage.

A brief description of the essential research trends has been highlighted below, and the outcomes were incorporated into the development of the CIR. It was hoped that by drawing on the most recent contemporary research trends and integrating them into the CIR, it would ensure that any outcomes of the SHELTER project that are guided by the CIR will remain consistent with cutting edge developments.

3.2.1 Embracing complexity

Previous academic research has concluded that the limited cognitive ability of humans to understand the complex intricacies of urban systems was, limiting our ability to achieve urban resilience (Comfort *et al*., 2001; Fraser *et al*., 2003). However, more recent research inquiries have identified the value in advancing ICT as a way to bridge this limitation and allow experts to embrace this complexity facilitated by advancements in technology. Yu *et al*. (2018) refer to this new technological paradigm as the '*age of big data*.' In which metadata sources such as; satellite imagery (Skakun *et al*., 2014; Pradhan *et al*., 2016), computer modeling (Rahmati *et a*l., 2020) and automated planning software (Dewals *et al*., 2019) have changed the way human society can adapt to climate change (Gaillard & Mercer 2013; Yu *et al*., 2018).

These tools provide vast amounts of data to support the development of DDA. Yu *et al*. (2018) go further emphasizing that the big data paradigm not only refers to the availability of data but also the advancements of ICT in increasing the ability to disseminate, analyze, communicate and present significant metadata sources. Within the context of CCA, DRM will allow the development of better-informed decisions and more achievable resilience goals.

However, Desdemoustier *et al*., (2019) appear to disagree with the impact of the availability of data, stating that there is a need for researchers to understand how the wealth of academic research and metadata on various topics relating to the urban environment is being recognized and utilized by individuals on the ground (Desdemoustier *et al*., 2019.). With specific reference to cultural heritage, one example of this is the difference in perceptions and definitions for cultural heritage between 'users' and 'experts' (Ginzarly *et al*., 2019). According to Ginzarly *et al*., 2019, the emphasis is being placed on the value of real-time, interactive metadata sources such as the potential of social media to bridge this gap (Ginzarly *et al*., 2019).

In summary, there is a growing trend to embrace the inherent complexity of multifaceted issues associated with natural disasters. However, there is a lack of research inquiry to explore how this complexity is translating to pragmatic solutions with specific reference to the development of the CIR.

3.2.2 Role of technology, sentience, and artificial intelligence

Potentially, one of the most important trends in contemporary academic literature is the incorporation of ICT and the call for a higher degree of autonomy and sentience within ICT and planning support systems. According to Deal *et al*. (2017), this means that these systems are capable of a much higher degree of reasoning and iterative learning. Capable of temporal and spatial reasoning, iterative learning, and understating the bespoke context of an area. This includes both DDA (Deal *et al*., 2017; Rechstein *et al*., 2019) and also the advancement in tools used to map/value cultural heritage (Li & Chen, 2020),

Furthermore, Deal *et al*., (2017) postulate that the growing requirements we are placing on current planning support systems to create more resilient cities are in conjunction with the concept of sentience. Furthermore, embracing complexity by collecting and presenting vast amounts of data is not sufficient. We require a more intelligent and intuitive information delivery systems to process this data.

To some extent, this evolution towards sentient systems has already begun. The concept of 'Smart cities' has no agreed definition (Caragliu *et al*., 2011; Batty *et al*., 2012; Albino *et al*., 2015). However, it is evident amongst the variety of academic literature, the integration of ICT into the cities infrastructure and permeation of it into intelligent-acting products and services is integral (Klein and Kaefer, 2008).

When combined with the increasing complexity and the inability of humans to fully comprehend this complexity, more sentience systems and decision-making tools should be considered the next logical step (Deal *et al*., 2017). The interesting question here is how this relates to cultural heritage and what specific components we can draw out to include in the CIR, an aspect which will be developed in much greater detail in T6.3 during the mapping and development of adaptive governance mechanisms.

3.2.3 Emphasis on collaboration, empowerment, and bottom-up thinking

As stated previously in the report, the concept of adaptive governance has been growing in momentum for over a decade, and it remains an essential aspect of modern research (Chaffin *et al*., 2014). This is mirrored by a similar research interest in CBA and bottom-up approaches in which the concepts of adaptive governance and 'bottom-up thinking' or CBA collide. All of which appear to be in response to the failure of 'top-down' more static governance mechanism to react to the rapid, unique, and often unpredictable nature of the issue's modern civilization faces. It is evident across several disciplinary lenses that there is a clear paradigm shift towards the power of community knowledge and incorporating it into the broader decision-making process. Within the literature, the emphasis is focused on the empowerment of the local community. In which approaches challenging the current institutional system or become integrated within the communities themselves (Archer *et al*., 2014).

3.2.4 Summary & Implications for the CIR

A consideration of these research a preliminary understanding of them can help to guide the development of CBA that have longevity and remain consistent with the ongoing investigation. First of all, is the clear need for experts involved in DRM and CCA to embrace complexity rather than be threatened by it. ICT is inevitably going to form a much more significant component of future DRM, CCA, and facilitating the transition of metadata, and enhancing the dissemination of information autonomously. However, these approaches must be developed with the end-users in mind addressing the research gap identified previously in the report. As a result, it is essential to ensure that these contemporary research trends are used to inform the SHELTER research project.

3.3 Community-based approaches & ICT

3.3.1 Understanding the importance of community within the context of the SHELTER Project

Communities play an essential role in a wide array of issues as catalysts of local action (Chavis & Wandersman, 2002). Many academics have highlighted the importance of the sense of 'community' as a mechanism for conservation, preservation, development, and resilience (Chavis & Wandersman, 2002; Ohmer *et al*., 2009; Kothari *et al*., 2013). Records are littered with examples of the destruction of culturally significant sites being mourned by people and even more of communities mobilizing to protect significant buildings and places in which they see the value (see D6.1)

As a result, CBA provides an integral and valuable mechanism regarding the resilience and understanding of important cultural heritage sites and buildings in Europe and across the world (Greer, 2010). However, to tap into this powerful mechanism, we must understand and quantify what is meant by the term 'community.' According to McMillian & Chavis (1986), the first conceptualization of community was presented in a paper by McMillian in 1976 in which he focused on the idea of group cohesion. McMillian & Chavis (1986) built on this and provided the following definition;

> '*A feeling that members have of belonging, a feeling that members matter to one another and the group, and a shared faith that their member's needs will be meet through their commitment together.*'

For the context of the CIR, this definition is preferred because of its general nature and allows for the exploration into a variety of different aspects of community psychology. For decades, the research around the term 'community' has snowballed and a vast array of literature attempting to explore the concept of community in all its different iterations (for example, see. Plant, 1978; Greer, 2017). According to Chavis & Wandersman (2002), the term community can be used to identify a variety of different things across social sciences, including; society as a place, community as relationships, and society as a collective power. Despite the various identifications of community there is some essential reference such as Chavis & Wandersman (2002) who postulate that integral to all of them is the exists a process for improving the quality of life within that community' which typically takes the shape of voluntary community groups with a shared vision or goal. It is this mechanism that is integral to the CIR. There is, however, a complication that each country and each community is subject to its unique mix of factors that must be accounted for when developing CBA to DRM or anything else (Shaw, 2012).

3.3.2 Bridging the gap between big data sets & CBA

There is a current focus on the rapid implementation of new research and associated technologies into decision-making processes (Thomas *et al*., 2004) but however excellent and relevant some contemporary research may be, uptake and impact are 'slowed' by interdisciplinary information exchanges (Moss *et al*., 2010). By way of example, even though public participation is considered a crucial part of the decision-making process (Antweiler, 1998), there is limited knowledge on its effectiveness of ICT generally in practice (Marshall & Taylor, 2005; Conrad *et al*., 2011). Despite emphasis being placed on collaboration (Carter *et al*., 2015) and the value of such knowledge in creating effective and resilient solutions.

However, while the implementation of ICT does indeed seem to provide a valuable tool in the development of CBA, it faces different barriers and limitations to conventional ICT approaches. For example, Gutierrez (2014) states that typical ICT approaches are implemented and managed by one organization. However, in contrast to this, the successes of CBA typically rely on the collaborations between different stakeholders (Marshall & Taylor, 2005). Therefore, the implementation of ICT into CBA meets challenges that are not typical of larger commercial applications. According to early research form a case study in Malaysia, these include; '*costly infrastructure, connectivity, and use*,' '*language of resources*,' '*coordination of approaches*' and '*skilled human resources and ICT awareness of local rural communities*' (Bala *et al*., 2002 available in Marshall & Taylor, 2005). For speed, these have been used as a baseline and explored/amended below according to up to date literature.

Funding & finances – financing is a well-cited limitation for many aspects of policy development. CBA is no different. According to King *et al*., 2016), limited funding or poor allocation of funding can ultimately hinder the successful implementation of ICT into CBA.

Language barriers – It became clear that language can be a dramatic barrier to the implementation of ICT into CBA (Bala *et al*., 2002; Pye, 2003). Materials that are not in the native language and a culturally appropriate format will not be accessible by the community. Or, at the very least, increase the time in which it takes for the approach to be adopted because the material has to be rewritten.

Availability of skills – the implementation of ICT requires specialist skills. While these may be found in organizations that implement ICT approaches, they can prove more difficult to find amongst local people within a community group. Furthermore, this barrier can be exacerbated by some individual's pre-existing fears of technology, and, even in some circumstances, isolated communities' lack of knowledge regarding the existence of the internet (Marshall & Taylor, 2005).

Knowledge & Connectivity – Often referred to as 'bridging the digital gap,' connecting all communities to the internet is a pressing policy issue (Phillip *et al*., 2017). Across the literature, there are two main reasons cited that are contributing to this digital divide, which is infrastructure and ICT literacy. The practical implementation of ICT

requires both Infrastructure to function and also a degree of knowledge or training to use ICT effectively (LaRose et al., 2007). Very often, this knowledge and expertise may not exist in the community, which can limit the uptake of ICT approaches. The following section of the report uses these barriers and limitations of ICT and focuses on the role of social media in incorporating ICT.

3.3.3 Role of networking & social media in decision making with a specific focus on its role in cultural heritage and buildings

Humans are social beings (Fiske, 2018), and the value of healthy relationships and bonds with other human beings is well established in research. Since the turn of the millennium, networking facilitated through ICT has become commonplace (Gilchrist, 2019). According to Gilchrist (2019), networking is recognized as an essential element in active community development. As well as a source of strength and a valuable tool in offering new ways for people to engage with heritage and improving the understanding of cultural heritage (Paganoni, 2015). However, as practitioners, only within the last decade have researchers begun to fully appreciate the value of 'networking' and the power of online platforms like social media in society (Gilchrist, 2019).

ICT has changed how humans perceive and engage with heritage internationally (Sedlacik, 2015; King *et al*., 2016; Khalid & Chowdhury, 2018). With increasing literature exploring the capacity of ICT in particular social media in cultural heritage (van der Hoeven, 2019). This includes; the preservation of language and culture (Arobba *et al*., 2010), providing cost-effective and direct communication channels for cultural tourism (Belenioti & Vassiliadis, 2015; Youkongpun, 2015.); crowdsourcing metadata through social gaming (Paraschakis & Friberger, 2013); producing cultures of participation (Liew, 2014). These approaches can vary significantly in their application and complexity from simple mobile guides or active social media accounts to detailed three-dimensional interactive tours of cultural heritage sites (Lewi, 2015; King *et al*., 2016). However, different their application at their core, these approaches emphasize connectivity, co-production, and the ease of participation (Lewi, 2015).

With specific reference to cultural significant heritage sites, social media can be used in different ways. First of all, many scholars highlight the value of social media in providing an interactive space for engagement and participation. In which people take advantage of the connectivity offered by social media and interact with heritage sites (van der Hooven (2019).).

Secondly, social media can function as a platform in which communities present their values of historic sites in the form of narratives. A phenomenon in which King *et al*. (2016) colloquially referred to as a 'shop window.' This is a powerful tool in making these sites available to a broader audience and has a strong influence on how heritage sites are perceived and valued by individuals and more general publics (Giaccardi, 2012; Farahani, 2018). This dramatic shift in the accessibility of different cultural heritage sites has changed the notion of aesthetic value in heritage sectors, no longer are sites valued by experts in a top-down format (Labadi, 2013).

3.3.4 Barriers & limitations affecting the uptake of ICT such as social media by heritage institutions

While the power of ICT as a means of engaging with people is evident, many authors emphasize caution. For example, King *et al.,* (2016) collected survey responses from different experts attempting to understand the potential successes and failures of institutions capitalizing on the potential of social media within the context of a museum. According to King *et al*. (2016), there are several barriers and considerations when developing an approach, the most applicable have been outlined. The most significant obstacle to the successful implementations of social media into cultural heritage was the poor allocation and availability of long-term funding. Poorly, allocated financing would lead to failures in ICT in something which they define as 'expensive furniture.' This colloquial term effective refers to the implementation of an approach that looked great in theory but ultimately failed to engage with people. As such, the ICT seems attractive but is eventually not serving its intended purpose.

Secondly, King *et al*. (2016) draw attention to the question of whether certain elements ICT can detract from the intrinsic value of objects. i.e., people value the digital interaction and not necessarily the aspect of cultural heritage. This avenue of research provides a more philosophical question into the discussion.

3.3.5 Summary & Implications for the CIR

The purpose and function of ICT must be carefully considered and designed to mitigate the waste of funding in a mechanism that does not work and serves as 'expensive furniture.' Within the SHELTER project, a collaborative bottom-up approach which helps to overcome this barrier as local knowledge from the end-users will help to ensure that any outcomes are in line with their requirements. Furthermore, emphasis must be based on the self-sufficiency of such applications and the ability of ICT to define a long-term purpose outside of DRM. Because of the erratic nature of natural disasters and the requirement of approaches to be established before any accidents occur, the approach needs to be ready to be deployed instantly, meaning that it must have a purpose outside of DRM. Finally, because of the growing trend of misleading information and fake news, any approaches will need to be able to differentiate and filter information.

3.4 Ensuring equal access, inclusion & representation

3.4.1 Isolation and access

Not all communities have access and/or equal access to the internet. Academic and policy documents are abundant from across the world that highlight this issue and refer to it as the 'digital divide' and the myriad of factors driving it. It has been a pressing and active avenue of research for many years not only because of its implications to ICT & CBA to help with protecting crucial cultural heritage but as a tool for economic development. The digital divide is a result of two significant issues 'connectivity' and 'inclusion' (Salemink *et al*., 2017). Connectivity refers to the implementation and high-quality infrastructure, ensuring that all communities and individuals without distinction of gender/ages/socio-economic vulnerabilities have equal access to ICT.

According to West, (2015) The key barriers and limitations to equal access are; 1) socioeconomics, the cost of devices and high telecommunications fees; 2) Poor infrastructure, supporting stable connections 3) digital literacy or trust, reducing peoples fear to interact with ICT and finally, 4) Other policy or operational barriers. The usage of ICT and the level of competency amongst different publics is closely related to socioeconomics. Socioeconomics refers to an individual's income and the amount of disposable money they have available to spend on digital devices used to access ICT, which are expensive. A clear correlation exists between the level of internet penetration and the average GDP within the country (Deloitte, 2014.). This correlation does not only exist at national scales, but a similar trend is visible between community groups considered to be within more economically developed countries. This issue goes beyond merely the ability to purchase technologies to utilize ICT but is also linked to the ability to spend money on education and training. For instance, Hargittai (2018) observed a considered difference in adults' internet know-how, which was strictly related to their level of income as well as the autonomy of use.

The length of this digital divide varies dramatically on a case by case basis. In some circumstance's communities have do indeed have access to the internet, but it or it is slow and unreliable, limiting its accessibility and usage (Dickies *et al*., 2010). In contrast, some communities have no access at all because of a lack of fixed infrastructure necessary to bring high-speed internet (Strover, 2001). Reasons limiting the development of connectivity seem to be based purely on economics. Historically, telecommunications consider the cost of connectivity isolated rural communities to not be economically viable because of the complexity, work, and resources required to deliver services (Best & McClay, 2002). Thankfully, advances in technology have meant that cost of providing ICT to these isolated rural communities has reduced dramatically within the last few years (Nandi *et al*., 2016) this has led to the development of many bottom-up strategies to provide training, education, and empowerment (Rao, 2004).

3.4.2 Issue with urbanization & communities concerning cultural heritage

We are an increasingly urbanizing civilization, and by 2050 68% of the world's population will live in urban centers (UN, 2018). While on the one hand, this means that they will have access to ICT overcoming some of this issue related to inclusion, as stated in the previous section. Another set of distinctly different problems arise, which can have an impact on the development and uptake of practical CBA.

For decades well tested scientific theory established the relationship between urban environments and alienation or unhappiness (Wirth, 1938). There is a multitude of reasons for this difficulty. First, urban centers are sophisticated and tend to have a higher degree of demographic complexity than rural settings (Pumain, 1998; Thomas *et al*., 2015). Differences in age, race, and religious beliefs, etc., can be a distinct barrier for specific communities and prevent people from making a connection and indeed prevent the people from developing relationships. Furthermore, there is evidence amongst literature that suggests that individuals who live in urban settings find it difficult to realize and establish neighborly contacts. What the research highlights is that fact developing communities with urban environments can be extremely challenging. As a result, if society becomes increasingly urbanized as the global trend suggests, then we need to account for these issues in consideration of ICT within CBA and foster local communities and a GLOCAL approach.

3.4.3 Considering the implications of dependency

Dependency in the context of this report refers to the effect in which a community becomes dependent on external assistance over the long term in response to a disaster event (Harvey & Lind, 2005). This dependency creates a multitude of adverse effects after the initial disaster has long since passed, such as; exacerbating poverty and poor economic conditions (Acaye, 2015). This dependency fosters a sense of shame and defeat. All of which are interrelated and interacting, creating a self-fueling cycle that is difficult to break. This development of dependence on external assistance became identified as a reoccurring phenomenon and is cited in contemporary academic literature as the '*dependency syndrome*.' Because the event of a dependence syndrome can be so damaging and economically costly, it can prevent external assistance in the first place. Intervention by external sources undoubtedly influences the local community's way of life. Interestingly a preliminary search of academic literature regarding the potential impact of this dependency syndrome on cultural heritage yields very limited results.

3.4.4 Caution of relying on ICT in a disaster

The implementation of wide-scale ICT technologies requires infrastructure (ESCAP, 2016). The complexity of this infrastructure can vary significantly across different countries and amongst different communities within those countries (WEF, 2014). Whatever their design, they remain integral in connecting these communities and, unfortunately, can be prone to failure. Natural disasters can damage this infrastructure (ESCAP, 2016) and, as a result, potentially affect the connectivity of ICT and causing a breakdown in well designed and established DRM strategies that utilize these systems.

This, combined with the increasing severity and frequency of natural disasters (Pelling, 2001), creates a potential recipe for failure if alternative means of communication or back-up systems are not in place (Little, 2002). Therefore, the development of the CIR needs to understand what kind of approaches and back up strategies can be implemented and, if not, what alternatives can be used to ensure the continued access of ICT. Furthermore, the failure of the established infrastructure is not the only factor that could limit the accessibility of CBA. There is a precedent for full-scale DRM strategies creating false warnings, which may cause panic and escalate issues (DeYoung *et al*.,2019).

3.5 Community interaction rulebook

The following section of the report outlines the CIR to help the OL co-ordinators within WP7 to develop resilient and robust CBA to protect important cultural heritage sites

The next chapter draws from the literature explored in the previous sections to consolidate the essential findings and outcomes into a sixteen-page CIR to be used by the five OL co-ordinators within WP7 to build robust, inclusive, and effective CBA to help protect cultural heritage sites.

3.5.1 CIR structure

For ease of access, the entire CIR is encapsulated below and separated into three distinct (but interrelated) parts to reflect the three aspects of the report above. The three elements have been outlined as follows;

Part 1; Consolidates the critical characterizing aspects of the concept of DDA, DRM, CCA, cultural heritage, adaptive governance. An outline of these concepts provided the OL co-ordinators with a quick appreciation of the broader conceptual framework in which their work fits. Furthermore, part 1 also briefly outlines the major contemporary research trends at the cutting edge of DRM, ICT, and CBA. Together, Part 1 of the CIR ensures that regardless of the bespoke situation and unique mix of interrelated variables affecting a heritage site. The first part of the CIR provides a 'metaphorical touchtone' in which the practitioners in the OL can create CBA, which fit their unique requirements but remains consistent with the holistic wide-scale implementation of DRM strategies.

Part 2; Provides nine 'rules,' which outline the essential operational aspects which have been elicited from literature and examples of 'best practice.' The nine rules provide the OL co-ordinators and the experts within the OL with the essential operational 'nuts and bolts' which can help to develop robust and effective CBA that utilize ICT. The rules cover a wide range of aspects from the implementation of metadata sources at the local level. As well as the integration of local knowledge sources and the critical role of facilitation.

Part 3; Outlines a final four 'rules' for consideration in the OL to ensure the inclusivity of all stakeholders and the different variables which can lead to the isolation of various community groups. Furthermore, it highlights the potential limitations and barriers that may arise or limit the practical application of specific approaches.

Finally, before proceeding with the application of the CIR, it is essential to note that the contents within are by no means a FIXED SET OF RULES but should be treated as guidelines to stimulate further thought and development

3.5.2 Part 1 – Relevant Definitions & Conceptual Grounding

The following section briefly outlines the key aspects of the significant concepts relevant to the CIR. Below is figure 7 that consolidates all of the core conceptual terms explored in previous sections. While many practitioners and policymakers may be indeed comfortable using these terms and have their interpretations of what they mean to them. It was considered essential to categorize them succinctly within the context of CIR.

Figure 7. Characterization of the significant concepts which make up the conceptual framework that supports the CIR.

3.5.3 Conclusions from contemporary research trends & relevance to the CIR

The following sections draw from the literature review to provide the OL co-ordinators within WP7 and any other experts charged with the development of CBA with conceptual groundings and operational guidance. With a particular focus on incorporating ICT to produce CCA measures aimed at protecting cultural heritage. This section of the CIR is designed to highlight the contemporary trends visible across academic literature, which has a direct influence within the scope of the SHELTER project and essential to consider when developing CBA approaches.

3.5.4 Embracing complexity into CBA

The issues civilization faces are complex and multifaceted. Abundant data sources, multiple stakeholders, various overlapping policies and governance, wicked problems, conflicting opinions, etc. all contribute to a complex and what can be an overwhelming situation. However, rather than become overwhelmed by this, we are encouraged to acknowledge and embrace the complexity of these problems. By adopting this complexity, we have the opportunity to explore issues from other perspectives and, as a result, start to work in more multi/trans/interdisciplinary ways. Allowing experts to seek help outside of their organization and disciplinary lens, leading to more robust solutions. Furthermore, when developing CBA and attempting to utilize ICT, it is essential to acknowledge that ICT provides a platform in which the multitude of metadata sources and complex interacting factors can be harnessed into a more accessible and practical form. Permanently, by embracing the complexity, we can establish partnerships with other experts across disciplinary boundaries and spatial scales, which can help us to produce more robust solutions, share resources, knowledge, and funding.

3.5.5 Incorporating sentience and/or artificial intelligence in community-based approaches

Technology is developing at a rapid pace, and along with it, so is the ability and complexity of the ICT that experts use to inform and support decision-making processes. It is in this space in which there is a call for a higher degree of sentience and artificial intelligence to be incorporated into contemporary ICT. Not only would this help us to embrace the complexity highlighted in the previous paragraph, but it would also allow us to overcome the bottleneck in which humans play in the analysis and dissemination of the data to different stakeholders. As a result, the stakeholders in the OL are encouraged to review the ICT systems that they implement (if any) to help inform their decision-making processes.

3.5.6 Collaboration & coproduction

There is emphasis across research, policy development, and effective delivery on collaboration and coproduction. Knowledge from both bottom-up and top-down sources allows for the development of solutions that are both academic robust and practically useful. Therefore, it is important for an approach being developed as a result of the SHELTER Project to incorporate different knowledge sources. This has already been addressed in the application of the GLOCAL strategy outlined in WP2 and the outcome of WP6. However, it is essential to emphasize this as a distinct element within the CIR.

3.6 Part 2 - Operational guidance & 'Rules' for good practice

The following section of the CIR provides some operational guidance and explicitly outlines some of the rules of 'good practice' when developing CBA. These rules have been developed from the literature review underpinning the report as well as a more specific exploration into CBA and community responses to disasters themselves.

3.6.1 - RULE 1 – Identify the types of communities within an area (if some already exist) & acknowledge that these are keys in developing CBA to protect important cultural heritage sites against risk and natural disasters.

To develop valid CBA, it is essential to establish what types of communities currently exist within a given area. Alternatively, highlighting the lack of any identifiable communities and reasons why they don't exist. There is a lot of academic literature available, exploring the complex nature of community development. The distinction between terms can become convoluted. For example, words such as; 'group,' 'community,' and 'network' have been used interchangeably (Lappas. *et al*., 2009) seeming without any specific research inquiry into how this is affecting their identification on a practical level.
While they may all be considered types of 'communities' in literature, an argument could be made that they are distinctly different. Pragmatically, the convoluted nature of these terms creates a problem because depending on how a community is structured may affect how experts engage with it and develop CBA to work in conjunction with it. As a result, Rule 1 provides a basic guide on how the OL-coordinators may differentiate between different types of community groups. Identifying the different kinds of community groups can help to design reliable methods of engagement that are both consistent with how those different communities communicate, disseminate information, and mobilize. Essentially, providing a platform to develop 'tailormade' CBA which have a greater capacity for success. To achieve this, the following observable variables were elicited from different sources to help differentiate between community groups and produce recognizable typologies building on the work previously conducted by Ospina (2017).

INTERACTIONS – The term interaction broadly refers to the type and level of communication found amongst the individuals within the community. The level of interaction can range from **simple** monodirectional exchanges that do not require a direct response such as newsletters or social media posts. Furthermore, in these cases, simple communication channels don't necessarily need direct input from all members of the community. In contrast to this, it is possible to have multiple levels of **complex** interactions between different community members. Complicated forms of interaction are typically bidirectional such as debates, discussions, and conversations, which require some direct response or contribution. Furthermore, it may also require an appreciation of more subtle forms of interaction, such as body language.

TRUST – The concept of trust in the context of defining community groups refers to the level of confidence individuals have to one another within the community. Trust can be a more difficult variable to determine. But it often manifests itself in the individual's willingness to share resources such as money, time, and social capital to the community. The level of trust between community members can also be visible in members' desire to collaborate with other members of the community. (Oxedine *et al*., 2003)

MEMBERSHIP – The term membership refers to the physical number of individuals that are included within the community. i.e., the members within an electronic social media group, individuals within a contact list, or those subscribed to the newsletters. Alone this information gives the real membership numbers. However, a higher level of appreciation must be given to the understanding and fluctuation of members' numbers within a community, which can be broadly defined as either 'static' or 'dynamic.' A static membership group refers to a community that has a consistent set of core members, which do not fluctuate dramatically over time. In contrast to this is a community with a very **dynamic** membership group that is rapidly changing all of the time, and it may be more challenging to identify a specific core membership group.

BOUNDARIES – Finally, the term boundary can be slightly more challenging to define in a practical sense, but an understanding of communities' perceived boundaries is fundamental in developing consistent CBA. The term boundary refers to the perceived barriers that can be drawn around a community group allowing for the formation and understanding of its identity and motivations. To achieve this, a community group's boundaries can be described as either explicitly defined or blurred. A defined limit can be observed in a community group that can be encapsulated by a definite number of people who have a clear notion of their purpose and the scope of that community. In contrast to this is a community group with a blurred boundary when the influence of the community group and its members cannot be explicitly defined. For example, a social media group has an extremely fuzzy sphere of influence which can be challenging to trace and expressly identify meaning the community group has blurred boundaries

These factors were used to develop a theoretical metric that is included below to enable practitioners in the OL to broadly characterize the different communities into specific typologies, which was adapted from work previously conducted by Ospina (2017).

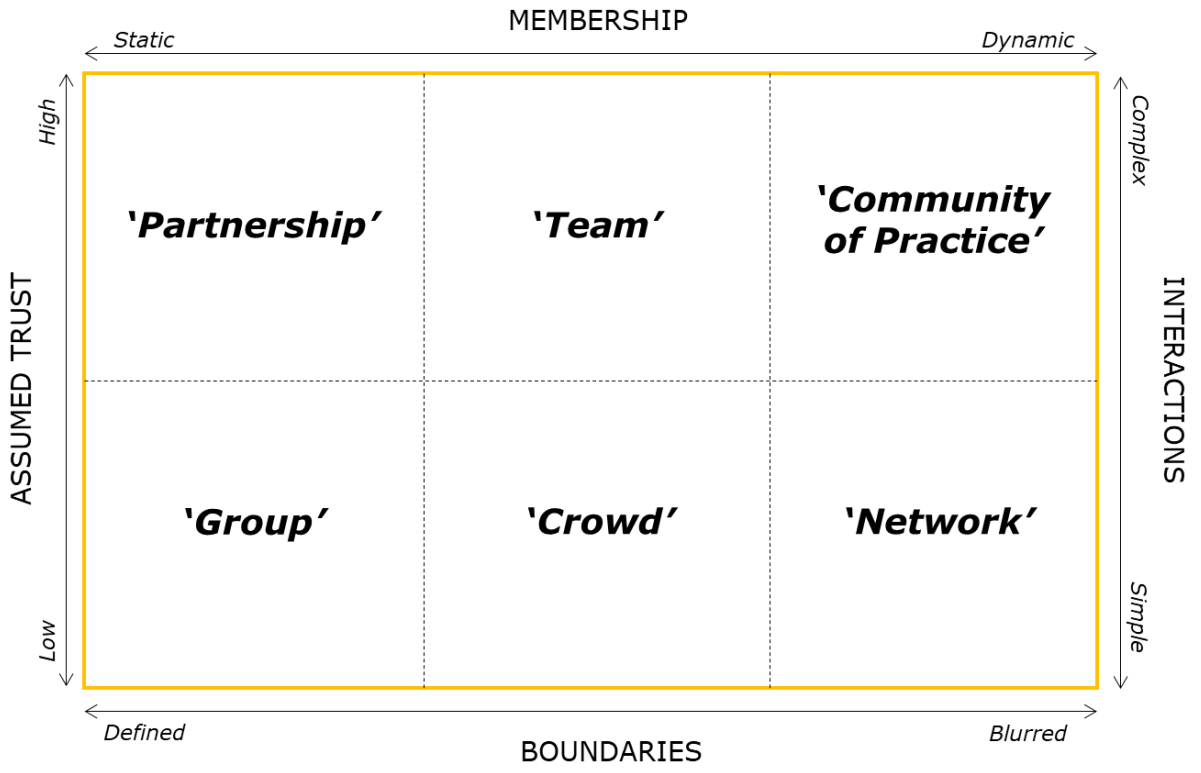

Figure 8. Metric which identifies six different typologies of communities that can exist dependent on four idealized characteristics. [Inspired and adapted from an original figure by Ospina (2017)]

The different types of communities that have been arranged in typologies above in Figure 8 are explored in greater detail below. For each typology, a brief description is provided along with the identifiable critical factors which can be used by the practitioners in the OL to distinguish between different community groups quickly.

Group – A group can be defined as a collection of individuals who are interested in a specific type of information or topic, and this is what brings the community together (McDermott, 1999). Groups often have a simple form of communication with limited levels of interaction between its members focused predominantly on the specific topic that initially brought them together (McDermott, 1999). As a result, high levels of trust between members of the group are not crucial to the long-term establishment and success of the community remaining viable. Finally, their core membership typically remains static and is often not unusually large. Reference is made in academic literature to them having a weak sense of identity (McDermott, 1999). *Examples of a group include an interest group, a neighborhood, or an educational class.*

Crowd – Conceptually, crowds seem to share a great deal in common with a 'group' only with a more dynamic and extensive membership base. The higher membership numbers and more dynamic membership base typically creates a community group that doesn't require a high degree of trust between members. As a result, the communication between these individuals is relatively simple. However, the most significant contrast to a group is the fact that they can have a strong sense of identity expressed in literature as a 'collective consciousness' often driven towards a specific purpose or goal which holds the individuals of the community together. *Examples of crowds include spectators at an event, a political rally or a protest.*

Network – A network can be defined as a collective of people who share a common interest *or* purpose. The communication between members is considered to be relatively simple via newsletters or social media posts, and the interaction between members of the community is often limited (McDermott 1999). As a result of the developments in ICT and social networking, the occurrence of networks has become increasingly prevalent. In contrast to groups, networks have an extremely dynamic membership base with very blurred boundaries. *Examples of Networks includes social media networks or a simple mailing list.*

Team – A team can be classified as a collection of people with a specific purpose or goal in mind. A team typically has a fixed core membership base with little fluctuations in membership. However, in contrast, to groups and crowds, the core identity and purpose of the group can evolve over-time without the community collapsing. As this happens, the core member of the team can recruit new members as the identity of the community changes. For these reasons, the members of a team typically have a high degree of trust between members and a strong sense of identity. *Examples of teams include a project Team, Sports Team, or department within an organization.*

Partnership – Partnerships share some characteristics with a team. They have defined boundaries within an explicit sphere of influence and a sophisticated form of communication and collaboration between its members. However, they are considered to have a more static membership basis because they typically share a lot of resources. The partnership is generally formed between organizations or between other types of the community for a particular purpose or goal limited by resources, time, and funding. *Examples of Partnerships include business agreements, Charity Groups, and large-scale events.*

Community of practice – '*a group of people with diverse characteristics who are linked by complex social ties, share common perspectives and engage in joint action in geographical locations or settings'* MacQueen et al., 2001. Communities of practice are a term used to encompass the traditional definition of the term community, which we see across academic literature. Within the scope of the CIR, the term community of practice is used to define a much more sophisticated type of the community in which the levels of communication are very complex, and the bonds that bind the members of the community of the group together are more profound than a shared vision or goal.

Furthermore, the emphasis is placed on the term 'practice' within this definition. In contrast to teams, partnerships, and groups, communities of practice are actively developing and delivering practical solutions to achieve their goals independent of outside support, resources, or assistance from other communities. As a result, communities of practice require a much more significant degree of motivation and trust from its members.

Within the metric, it is important to stress that one community is not superior to another. As a result, practitioners are not trying to achieve a specific type of community but rather identify the different typologies that exist and work with them. The reason for this identification is because depending on the type of communities in place, it will affect how experts within the OL interact with them and the types of methodological approaches that can be used to communicate and engage with them. Once the different communities have been identified, the next step is to determine the life cycle in which that community is currently experiencing. According to Gongla and Rizzuto (2001) [found in Andriessen et al., (2005)], the life cycle stage of a community group can be defined into five distinct phases which have been encapsulated into the figure below for use within the OL.

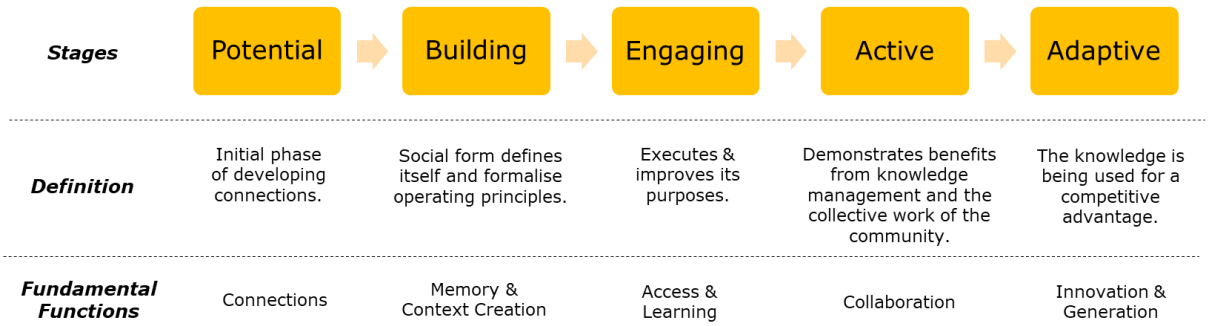

Figure 9. The different life cycle stages of communities provided to help experts to identify the different life cycle stages in which a community is experiencing [Adapted from Gongla and Rizzuto, (2001) found in Andriessen et al., (2005)]

Together the metric and life cycle above can help practitioners in the OL characterize the different types of communities that are being observed in any given situation. As well as the stage in the broad life cycle, the community is currently experiencing. For example, one of the communities that have developed within an area can be defined as a 'Potential Network.' This is a community that is actively occupying an open access online space with a tiny but slowing growing membership group with interest in areas of local cultural heritage. As a result, it does not have a set of explicit principles and is

beginning to form connections. In this is an example, there is an opportunity for OL co-ordinators to help develop the community's impact and connections and potentially refine the scope of the principles to include CCA and DRM measures. However, while useful in a practical sense, it is at this point at which it is crucial to express caution and not oversimplify the characterization of communities. While the above tools can help to identify the different types of community within society to support the development of the delivery of valid CBA, it is essential to understand the community's specific motivations behind and idea and bespoke context and variables, which are at play.

Prompts & Guidance

- *Are their groups of people who express shared cultural values, memories, and/or interests in stock, which is related to the overall approach, are an object of inquiry?*
- *Identified the different types of communities that currently exist within an area.*
- *If none can currently be identified, explore reasons why none can be found.*
- *Establish at what stage in the lifecycle the community you have identified are in.*
- *Using the information from above, consider the most appropriate methods to engage with the community.*
- *Is the community likely to evolve with time, and if so, how could an approach develop with it?*
- *Is there any support from local authorities?*

3.6.2 - RULE 2 - Establish a mechanism for effective facilitation.

Establishing a mechanism for effective facilitation is a critical component in the development of successful CBA. The term facilitator refers to the identification of an Individual or organization that provides an essential bridge between the broader DRM strategy and the CBA delivery solutions at the local level. The following guidance has been consolidated from the array of academic and practical sources to offer some advice on selected effective facilitation. For ease of access, the following rule has been broken down into three sections; The facilitator's job role, a facilitators important personal characteristic; and, a facility's essential skillset.

THE FACILITATORS JOB ROLE

Within CBA, a facilitator serves an important role. First of all, they are the primary source of communication and knowledge exchange between the community and the other stakeholders across different scales. They are charged with the organization, maintenance, and 'management' and help clarify the purpose and outcomes. While still finding the balance between providing guidance and support at the local level. At their core, they must be perceived as unbiased, serving the entire community aiming to empower and foster the development of healthy relationships rather than be negative.

Finally, a facilitator must have the capacity to assume a top-down leadership role when it is necessary to assign responsibility where appropriate.

A FACILITATORS IMPORTANT INTERPERSONAL CHARACTERISTICS

1. *Be respectful* – Respect is one of the vital interpersonal characteristics of an excellent facilitator. Respect forms the basis of relationships that the individual has with both the other members of the community and stakeholders outside of the immediately defined boundaries. A high level of respect creates a positive and safe working environment that allows for materials, resources, and issues to be shared before problems occur.

2. *Positivity & being optimistic* – As a facilitator, it is essential to maintain a positive attitude towards the work and the members of the community. Similar to respect and compassion, it can help to empower the members and facilitate more effective solutions and discussions.

3. *Flexibility* – It is essential to acknowledge that things do not always go according to plan. As a facilitator, it is necessary to have a flexible attitude towards the other members of the community.

4. *Selfless* – Finally, one of the vital interpersonal characteristics of an excellent facilitatory is the ability to be selfless. The person must put the need of the community above the needs of themselves.

A FACILITATORS KEY SKILL SET

1. *Organized* – the facilitator serves multi-functions at once within a CBA. They are a leader, treasury, manager, etc. as well as a facilitator. To fulfill this role efficiently, it is essential to have a high degree of personal organization.

2. *Communication skills* – the ability to communicate, listen, and understand all of the group is a critical skill that all facilitators must possess. This skill translates directly into their ability to summarize key points and delegate responsibility for a task to all of the individuals within a community.

3. *Conflict resolution & management* – A facilitator must have the ability to resolve disagreements between different stakeholders and/or members of the communities.

4. *Knowledgeable* – A facilitator must have enough knowledge and expertise in engaging with and disseminating information and resources to the community. With a specific reference to cultural heritage and natural disasters. They must be

seen as respected enough by wider stakeholders to deal with the information appropriately and trusted enough by the local communities to believe in the data.

5. *Computer literate* –The modern technology research trend and highlights the role of artificial intelligence and sentience. The internet provides an invaluable resource to connect communities. As a result, any facilitators need to be able to utilize these online platforms.

Prompts & Guidance

- *Is their currently someone within the community that is already acting or could act as a facilitator?*
- *If not, can an effective facilitator be nominated/chosen/selected based on the above criteria?*
- *Is there any way that the current role in facilitation could be improved or supported with tools or techniques?*
- *Explicitly discuss the purpose and role of the facilitator within that community.*

3.6.3 - RULE 3 – Using DDA in conjunction with local perceptions, experience, and knowledge to develop and deliver CBA to protect vulnerable cultural heritage sites.

It has become increasingly clear from the exploration of literature and the contemporary research trends that DDA are essential within the development of DRM strategies and CCA mechanisms. However, it is vital to realize that these mechanisms do not provide a complete assessment of an area. DDA should be used in conjunction with local sources of knowledge to create a more robust CBA. As a result, CBA draw from local knowledge sources and develop approaches that are consistent with the local communities.

Prompts & Guidance

- *What are the underlying emotions perceptions and attitudes being expressed by the community?*
- *Are these negative in response to any issues or problems or positive attempting to adapt and change?*
- *How is community knowledge being used to drive the decision or goals of that community?*
- *How can DDA and/or ICT be used to help inform or guide those approaches and combine emotion into those decisions?*

3.6.4 - RULE 4 - Effective strategies & approaches must be established proactively before disasters occur.

CBA and DRM strategies must be established before a disaster occurs. Ensuring that the approaches are in place before a disaster helps to mitigate the lag time between the disaster event occurring and mitigation strategies being implemented. Not only does this have the capacity to reduce the impact of the initial disaster in the short term, but it can limit more significant issues in the long term.

Prompts & Guidance

- *Identify the natural disasters that are most likely to influence crucial cultural heritage sites.*
- *Establish the concerns of the individuals within a specific area, and how that relates to the perceived natural disaster.*
- *Are there any up to date record of current cultural heritage sites available to the local community, if so, is it accessible?*
- *How can a proactive approach be established rather than a reactive approach?*
- *Explore the legacy and longevity of a given solution.*

3.6.5 - RULE 5 - There is a fundamental need to utilize pre-existing ICT rather than adopt or develop something new

It is not an effective use of resources to develop specific DRM social networking groups and CBA. It is essential to take advantage of pre-existing ICT within a community such as pre-existing social networking systems. There is a plethora of reasons for this. First of all, these networking systems have proven longevity with a purpose other than DRM and therefore are self-sustaining. This means they do not require influence from outside entities to maintain them. Secondly, they have a trusted place within the community, including established lines of communication and up to date contact lists with the ability to mobilize people and resources quickly. These communities must have the capacity to foster their values based upon the bespoke context and variable in that area. Typically, the sense of community referred to in rule 1 will manifest itself in these social networking systems. As a result, ICT can connect people and develop a sense of community without those individuals ever meeting.

Prompts & Guidance

- *Are ICT mechanisms currently being utilized within the community?*
- *If not, why not, and if they are, is it being used at its full potential?*
- *Would the community benefit for the application of ICT, and if so, what kind of format would be the most useful to the individuals?*
- *Is there a mechanism in place to maintain the ICT if it was implemented?*

3.6.6 - RULE 6 - Ensure approaches are community developed, community-led & community-owned.

It is paramount for the longevity and success of CBA to cultural heritage that all outcomes, strategies, and approaches are developed, led, and owned by communities' group themselves. Not only is this essential in ensuring that the responsibility and accountability of the process remain within the community. But ensuring that the approach is developed and led by the community group also helps to incorporate locally sourced knowledge (see rule 3), which is so often overlooked and currently missing from many approaches. When developing CBA that utilize ICT, the emphasis must remain on people. One of the fundamental successful aspects of other CBA is the fact that despite the focus on collaboration, increasing complexity, and availability of data to inform decisions, the approach focuses on the empowerment of the local community.

Prompts & Guidance

- *Be clear about where the motivation for the CBA comes from and make sure that it is the community that establishes it.*
- *How can the interference of external stakeholders be minimized?*
- *Are the CBA self-sufficient, or do they rely on any external support or resources? Is so, how can that support be reduced?*
- *Ensure that all material is published in a culturally sensitive and accessible format*
- *Does the community have the capacity to make effective use of such ICT-based approaches?*

3.6.7 - RULE 7 - Explore the unique cultural value and heritage within the specific area

It is essential to acknowledge that every situation is different and subject to its epistemological discourse. There will be a myriad of interrelated variables that contribute to a site's cultural significance and how the community values it. As a result, when developing CBA, it is vital to unpick the specific context in which the culturally significant aspects in an area rather than assume the cultural heritage that people value.

Prompts & Guidance

- *Acknowledge that no two communities and situations are alike, and every area is subject to its discourse.*
- *Explore the specific variables that affect the cultural heritage sites within an area.*
- *Review current methods of stakeholder engagement to ensure all relevant members of the community are included.*
- *Explore how different communities' value and respond to various sites.*
- *Look into the area's cultural history from a variety of stakeholder's perspectives.*

3.6.8 - RULE 8 – Understand that CBA does not operate alone and are part of a multipronged approach across different spatial and temporal scales

CBA do not exist in isolation. They form part of a much more comprehensive DRM strategy and governance framework, consisting of policy, regulations, legislation, research, and other CBA. As a result, they should not be developed in isolation but co-produced with consideration with other relevant work ongoing at different scales. This requires the OL co-ordinators and associated stakeholders to have a broader understanding of other projects and approaches and to be conscious of the more extensive DRM work, whether it is related to cultural heritage or not. Consideration of broader DRM strategies may demand an understanding of different disciplinary lenses but can also provide a valuable opportunity to enhance interdisciplinary working and develop CBA, which operates across different scales.

Prompts & Guidance

- *What DRM strategies, CCA mechanisms, and CBA are happening in the surrounding area and/or at other relevant scales?*
- *Does the approach consist of broader DRM strategies, policy, and/or another CBA?*
- *Are there any potential unexplored partnerships or collaborations?*
- *Does the approach consist of ongoing policy and or research on the implementation of ICT?*

3.6.9 - RULE 9 - Outline sufficient, clear and well-justified avenues of funding and other resources where necessary

It became clear from reading that one of the most significant limitations in utilizing ICT in CBA to cultural heritage was the availability of long-term funding and other resources. Poor allocation of finances or a failure to establish long term strategies to maintain an approach would result in an ineffective or unsustainable CBA. Therefore, it is essential to outline a clear strategy for sourcing and allocating funding. Furthermore, following rule 4, establishing long term CBA that effectively use ICT may require a self-sustaining purpose outside of DRM.

Prompts & Guidance

- *Are the approaches reliant on an external funding source, either implicitly or explicitly? If so, how can this source be reduced, and the reliance removed?*
- *Has the long-term maintenance and resilience of the CBA been considered from the start?*
- *Is there a plan to ensure that any approach is self-sufficient?*
- *Could the incentive of money be removed entirely from the CBA?*

3.7 Part 3 - Rules to improve inclusion & accessibility

3.7.1 - RULE 10 - Ensuring inclusion without access to the internet

Permanent and responsive internet is a fundamental component to the development of effectively utilizing ICT in CBA. However, a situation may arise in which this connection to the internet may be broken. There may be essential stakeholders who do not have reliable access (or don't use) the internet services and therefore are not included in the development of CBA. As a result, it is important where possible to develop or identify back up strategies that either rapidly restore the ICT or provide a different means of communication and engagement. This will ensure that the CBA will continue to operate independently, and the hard work used to create them will not be wasted.

Prompts & Guidance

- *What is the current infrastructure underpinning ICT? Are there any weak spots?*
- *Is there a back-up strategy in place if the current infrastructure is affected by a disaster? If not, could one be implemented?*
- *Could any other sources of media be used to disseminate information in place of ICT?*

3.7.2 - RULE 11 – Create ICT strategies which reach even the most isolated communities

Rural communities are isolated; in many cases, it is these isolated rural communities that have limited access to the internet and, therefore, will not benefit from any CBA that are developed using ICT. It is essential to develop robust strategies to ensure that these communities are included in the development of CBA that attempt to protect cultural heritage. The barriers that limit their inclusion can vary dramatically on a case-by-case basis.

Prompts & Guidance

- *What are the isolated communities and what factors are contributing to them being isolated; is it education, trust, infrastructure, socioeconomics, or something else?*
- *Are there any simple infrastructure solutions that could be implemented to help to connect isolated communities?*
- *What training or education be provided to improve people's accessibility to the internet?*

3.7.3 - RULE 12 - Developing a sense of community in urban environments in an increasingly urbanizing civilization

Modern civilization is rapidly urbanizing as more people live and work in urban settings. This creates an exciting mix of new challenges which we, as environmental experts, must face. One of the difficulties which are vital for consideration in the CIR is the affect urban environments have on people's wellbeing, 'sense of community,' and feelings of isolation. Developing robust communities is integral to the effective implementation of CBA (see rule 1). As a result, this highlights an immediate and growing issue regarding the inclusion of socially isolated individuals and where possible allowing communities to develop and flourish.

Prompts & Guidance

- *Are there a permanent means of communication that is regularly checked for people to get in touch with the community and/or facilitator?*
- *Who are the isolated individuals within the immediate area, and do they have an investment in the cultural heritage?*
- *Have you considered developing a means of reaching out to recruit or inform new members of the CBA?*

3.7.4 - RULE 13 - Ensure adequate resources for the project from the outset & develop longevity in the community-based approaches if resources run out.

Ensuring that adequate and accessible resources are in place is integral to the success of and CBA and ICT. This includes a wide variety of different elements, including explicitly allocated funding both in the short term and where necessary in the long term. Also, the individuals involved in the delivery must have adequate skill sets to implement strategies appropriately.

Prompts & Guidance

- *Be clear about what you are trying to achieve and the steps to get there.*
- *What resources, such as time, labor, technology, education, etc. are needed to deliver the CBA?*
- *Are all of those resources available and accessible before, during, and after a disaster? If not, where can the alternative sources be found?*

4 Conclusions

The following document outlines the CIR developed specifically to help the OL co-ordinators and stakeholders within the OL to create robust and effective CBA to reduce the vulnerability and protect the valuable cultural heritage sites. The thirteen rules described above should not limit the stakeholders and provide explicit guidelines to follow. But broad guidance used to help practitioners within the OL to think more deeply about their unique situations and to stimulate more comprehensive thoughts about CBA, ICT, and cultural heritage in line with contemporary research trends and examples of best practice.

Furthermore, the authors believe that the 'rules' within this CIR may highlight important aspects with implications in the broader research community.

First of all, there is no arguing the benefit that ICT provides modern DRM strategies. ICT allows experts to embrace a higher degree of complexity, use multiple meta-data sources, and enable machines to take on much of the analysis and processing, which can be time consuming and expensive. However, the use of ICT carries a lot of inherent issues that must not be forgotten as complacency, and reliance on ICT mechanisms can result in failures of well-meaning and expensive DRM strategies. Topics such as the vulnerability in infrastructure, lack of education and training, socioeconomics, and demographics can all play a profound role in uptake and usefulness of CBA that utilize ICT on the ground. While the contents of this CIR can help to potentially overcome and manage against some of these issues in the development phase, each area is unique.

Finally, the development of the CIR stimulates some more comprehensive thought around the definition and concept of 'community.' The term community is nebulous, and definitions can vary depending on disciplinary lenses. As a result, the term is often used interchangeably through policy documents and academic research alike. With the rapidly increasing research trend surrounding the concept of bottom-up research and the integration of local knowledge sources into overarching policy, there may be pressing research need to quantify better the 'types' of communities that exist. This is based on the assumption of how communities developed, communicate, and define themselves, is an integral factor in how we, as experts, develop strategies and methodologies to engage with them effectively. As of yet, there is very little research inquiry into this, and there are no examples of how to practically define community groups so that practitioners can engage with them efficiently.

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